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PROVISIONAL SPECIFICATION.

Improvements in the Method of and Apparatus for the Continuous Diffusion of Insecticidal Fungicidal and Germicidal Vapours.

We, JOHN DUNCAN CAMPBELL and WILLIAM HERBERT YATES both of the Irwell and Medlock Works, 185, Water Street, Manchester, Chemical Manufacturers, do hereby declare the nature of this invention to be as follows:

This invention relates to the method of and apparatus for the continuous diffusion and application of insecticidal, fungicidal and germicidal mixed vapours, and has been devised with the object of overcoming difficulties and inconveniences which have been encountered in attempting to economically and efficiently diffuse and apply the vapours of vaporisable fluid mixtures or solutions. Thus, it is found that if such a fluid mixture or solution be gradually heated in the ordinary manner, fractionation takes place and it results that the produced vapours vary in composition as the vapourisation proceeds, and that they may soon become either too strong or too weak for the purpose required. For instance, if an aqueous solution of nicotine be boiled in the usual manner, the proportion of nicotine in the mixed vapours will vary to so large an extent that very soon the proportion of the nicotine would be so small as to be useless as an insecticide, and there is no economical distribution of the nicotine.

An attempt to obtain the continuous evolution of vapours of mixed fluids for disinfecting purposes has been suggested and consists in dropping the liquid upon a heated porous substance contained in an open vessel. Although fractionation takes place, yet, the whole of the vapours being disseminated in a closed room it is possible to obtain thus a fair aggregate result. But such a method is quite useless, for the reason hereinbefore given, when the evolved vapours have to be successively applied in different limited areas or spaces, since no two of the spaces would be equally treated.

To overcome this and other difficulties, we have devised a method and apparatus whereby a practically instant heating and evaporating of the mixture or solution is ensured so that the evolved vapour is of constant composition.

We accomplish this by causing the liquid to fall upon a heated metallic surface constructed or prepared as hereinafter indicated, the temperature, and the rate of fall of the liquid being such as to ensure a practically instantaneous heating and evaporation from that surface.

The temperature is controlled by a lamp or other usual means for heating.

The metallic evaporating surface forms the bottom or part of a closed vessel or chamber and is constructed of a metal or alloy which will not, under the conditions of use, chemically act upon or be acted upon by the liquid or vapours. To avoid the retardation or evaporation which would result if the liquids were permitted to assume the spheroidal state upon the evaporating surface, we roughen, indent, or corrugate it and spread thereon a number of short lengths of wire held down by a layer of metallic gauze, also made of metal or alloy having the same qualities as that of which the evaporating surface and chamber

are constructed. By this means the liquid is prevented from assuming the spheroidal state, and owing to capilliary action, it instantly spreads over a relatively large heating surface of the wires and gauze, so producing the desired rapid evaporation. It is to be understood that the roughening or corrugating of the surface may be omitted when the wires are used and that the wires and gauze may be substituted by other equivalent metallic, or non-absorbent neutral devices.

The closed evaporating vessel is provided with an inlet for the fluid mixture or solution, and a pipe outlet so constructed that the issuing vapours can be locally applied as desired, by its means. The vessel with its lamp or heating device can be provided with wheels or otherwise for transport.

The mixed fluid or solution is contained in a separate vessel, from which it may flow by gravity or from which it may be forced by pneumatic pressure set up from time to time by a small air-pump connected with the vessel. This also is provided with means for its transport as described with reference to the evaporating vessel.

The liquid is conveyed from the storage vessel to the evaporating vessel through a suitable pipe in which there is a cock or valve by means of which the flow is controlled so as to produce the required result in the evaporator, that is to say the practically instant evaporation of all the entering liquid.

Dated this 17th. day of February 1902 A.D.

W. E. HEYS & SON,
Agents for the Applicants.

COMPLETE SPECIFICATION.

Improvements in the Method of and Apparatus for the Continuous Diffusion of Insecticidal Fungicidal and Germicidal Vapours.

We, JOHN DUNCAN CAMPBELL and WILLIAM HERBERT YATES, both of the Irwell and Medlock Works, 185, Water Street, Manchester, Chemical Manufacturers, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement.

This invention relates to the method of and to apparatus for the continuous diffusion and application of insecticidal, fungicidal and germicidal mixed vapours, and has been devised with the object of overcoming difficulties and inconveniences which have been encountered in attempting to economically and effectively diffuse and apply the vapours of vapourisable fluid mixtures or solutions. Thus, it has been found that if such a fluid mixture or solution be gradually heated in the ordinary manner, fractionation takes place and it results that the produced vapours vary in composition as the vaporisation proceeds, and that they may soon become either too strong or too weak for the purpose required. For instance, if an aqueous solution of nicotine be boiled in the usual manner, the proportion of nicotine in the mixed vapours will, vary to so large an extent that very soon the proportion of nicotine would be so small as to be useless as an insecticide, and there would be no ecomonical distribution of the nicotine.

An attempt to obtain the continuous and uniform evolution of vapours of mixed fluids for disenfecting purposes has been suggested, which consists in dropping the liquid into a heated porous substance contained in an open vessel. Although fractionation takes place, yet, the whole of the vapours being disseminated in a closed room, it is possible to thus obtain a fair aggregate result. But

such a method is quite useless, for the reason hereinafter given, when the evolved vapours have to be successively applied in different limited areas or spaces.

To overcome this and other difficulties, we have devised a method and apparatus whereby a practically instant heating and evaporation of the mixture or solution is assured so that the evolved vapours are of constant composition.

We accomplish this by causing the liquid to fall upon a heated metallic surface constructed and prepared as shewn in the accompanying drawing which represents a sectional elevation of a convenient form of the apparatus which we employ and to which reference will hereinafter made, the temporature of the metallic surface and the rate of fall of the mixture thereon being such as to ensure practically instantaneous heating and evaporation from that surface.

The heating effect is controllably produced by means of a lamp or other usual means for heating. In the construction illustrated, the lamp *a* and its burner *b*, are of the known construction for burning kerosene vapour, pressure being produced in the reservoir *a*, by means of the air pump *c*. A reservoir containing the liquid is fixed below the lamp reservoir *a*. This reservoir *d*, also is provided with an air-pump *e*, for the purpose of producing sufficient pressure within the reservoir to force the liquid upwards into the vapourising chamber *f*, with which it is connected by the pipe *g*, in which there is a control or regulating tap *h*. This pipe is coiled or takes a turn around the lamp burner, so that a preliminary heating is given to the solution or mixture before it reaches the evaporating chamber, which it enters at about the centre of the top plate, at *i*. The lamp flame can be protected from draughts by a gauze cylinder attached to the ring *j*, to which also is attached the swing-handle *k*, by which the apparatus may be carried. A guard *l*, may be attached to the handle to protect the hand of the person holding the apparatus from the heat. Strong wires *m* or the like may be employed for connecting together the evaporating chamber, the ring and the lamp reservoir. Only two of the wires are shewn by the drawing, but there are usually three or more.

A pressure guage *n*, can be attached to the reservoir for the purpose of indicating the pressure therein. It is to be understood that the reservoir need not be attached to the lamp as shewn by the drawing, since it may be quite separate and carried independently by the operator, and in this case, the liquid may flow to the evaporating chamber by gravity or under pneumatic pressure.

The metallic evaporation surface forms the bottom or lower part of the closed chamber *f*, and is constructed of a metal or alloy which will not, under the conditions of use, chemically act upon or be acted on by the liquid or vapours. To avoid the retardation of evaporation which would result if the liquid which drops thereon were permitted to assume the spheroidal state on the heated surface, we roughen, indent or corrugate it, and spread thereon a layer or short lengths of wire or like material *o*, which is held down by a layer of metallic gauze *p*, also made of a metal or alloy having the same qualities as those pertaining to the chamber and wire.

By this means, the liquid, which is regulated to fall upon the surfaces *o* and *p*, is prevented from assuming the spheroidal state, and owing to capillary action, it instantly spreads over a relatively large heating surface of the wires and gauze, so producing the required evaporation.

It is to be understood that the roughened or corrugated surface may be used without the wires and gauze, and that when the wires and gauze are used, the roughening or corrugation may be omitted, and that the wires and gauze may be substituted by other equivalent metallic or non-absorbent neutral devices.

The vapours arising from the evaporation are conducted to the point desired by means of a pipe *q*, a part only of which is shewn by the drawing, and to facilitate the application of the vapours, a flexible length of pipe may be intercalated if desired.

When the apparatus is constructed in the larger sizes, it may be mounted upon a carriage, instead of being carried by hand.

The evaporating vessel and the reservoir *d* in which the liquid is carried may, if desired, be fitted with safety valves, and an additional pressure gauge may be attached to the evaporating chamber.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. The hereinbefore described method for continuously and uniformly diffusing insecticidal fungicidal and germicidal vapours substantially as and for the means set forth.

2. An apparatus for continuously and uniformly diffusing insecticidal fungicidal and germicidal vapours, constructed substantially as hereinbefore described with reference to the accompanying drawings.

3. In apparatus for the continuous and uniform diffusion of insecticidal fungicidal and germicidal vapours a closed evaporating chamber having a roughened indented or corrugated floor, constructed substantially as and for the purpose hereinbefore described.

4. In apparatus for the continuous and uniform diffusion of insecticidal fungicidal and germicidal vapours an evaporating surface consisting of a layer of short wires or equivalent non-absorbent neutral materials, held in place by a permeable sheet of like material, constructed substantially as hereinbefore described.

5. In apparatus for the continuous and uniform diffusion of insecticidal fungicidal and germicidal vapours, an evaporating chamber having an indented roughened or corrugated floor and thereon a layer of short wires or equivalent non-absorbent materials held in place by a permeable sheet of like material, constructed substantially as hereinbefore described.

Dated this 17th. day of November A.D. 1902.

W. E. HEYS & SON,
Agents for the Applicants.

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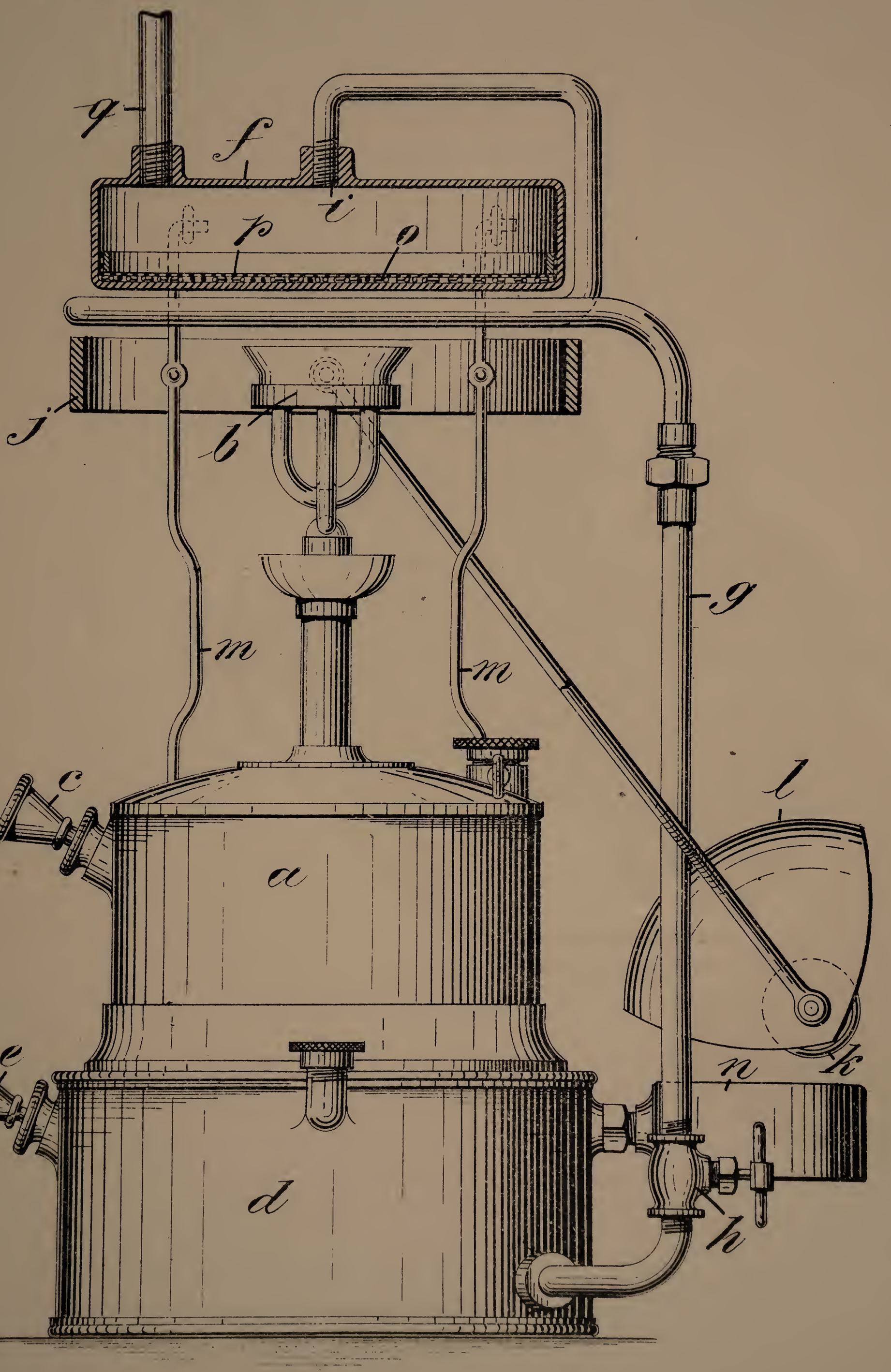
CAMPBELL & *another's* Complete Specification. *(1 SHEET)*



[This Drawing is a reproduction of the Original on a reduced scale.]

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